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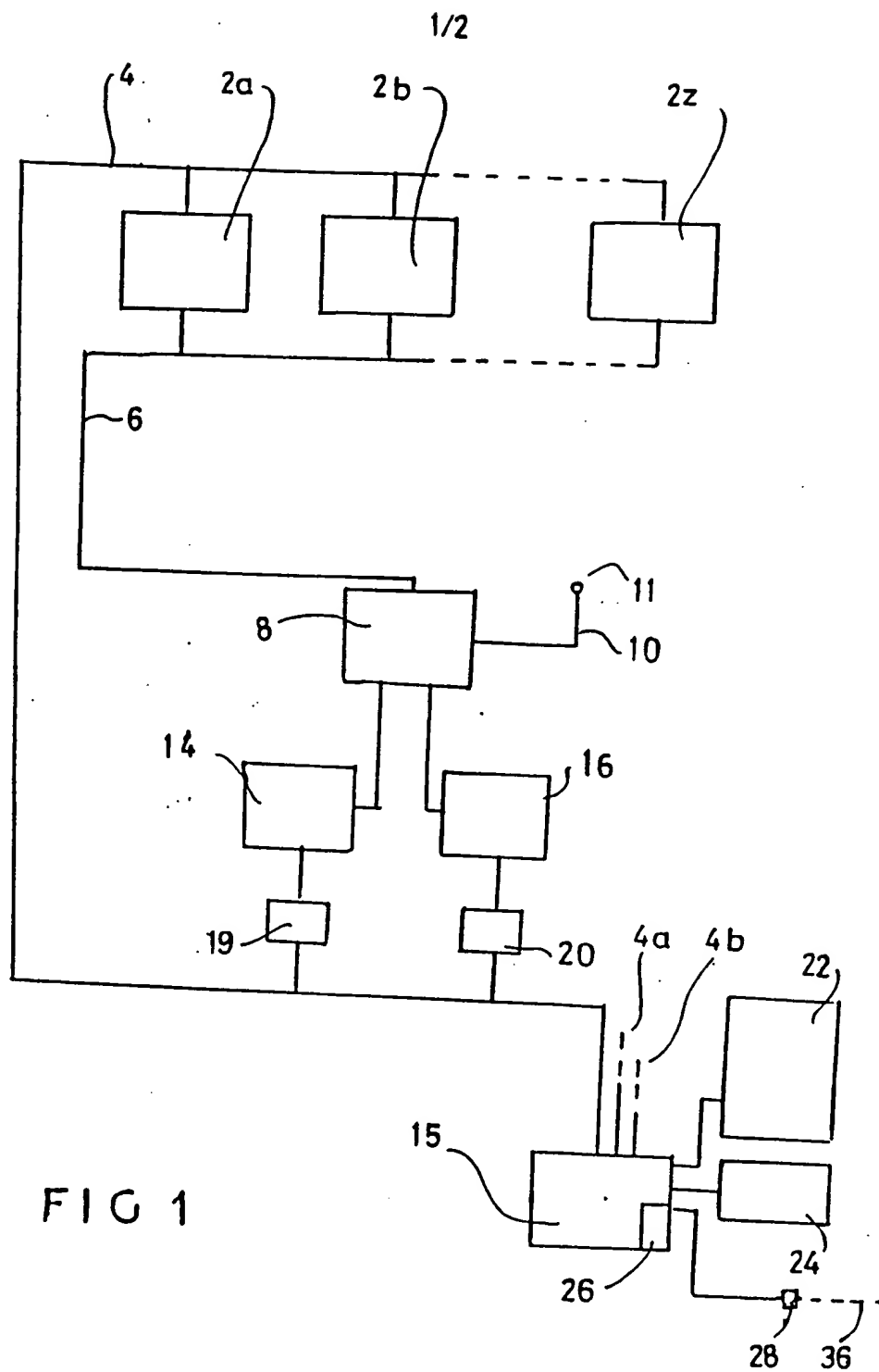
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## (54) Visual display system

(57) An installation for visually displaying predetermined messages, which includes a plurality of visual display units each to display messages addressed to it and each having means operative when its message reception means is conditioned to accept a message to change if required its current address upon receipt of an address-change message, such that the individual messages generated at the transmission control can be selectively displayed by different groups of the visual display units. The visual display units are conditioned to change their current address only when energised, the units reverting to their original address when the power is switched off.



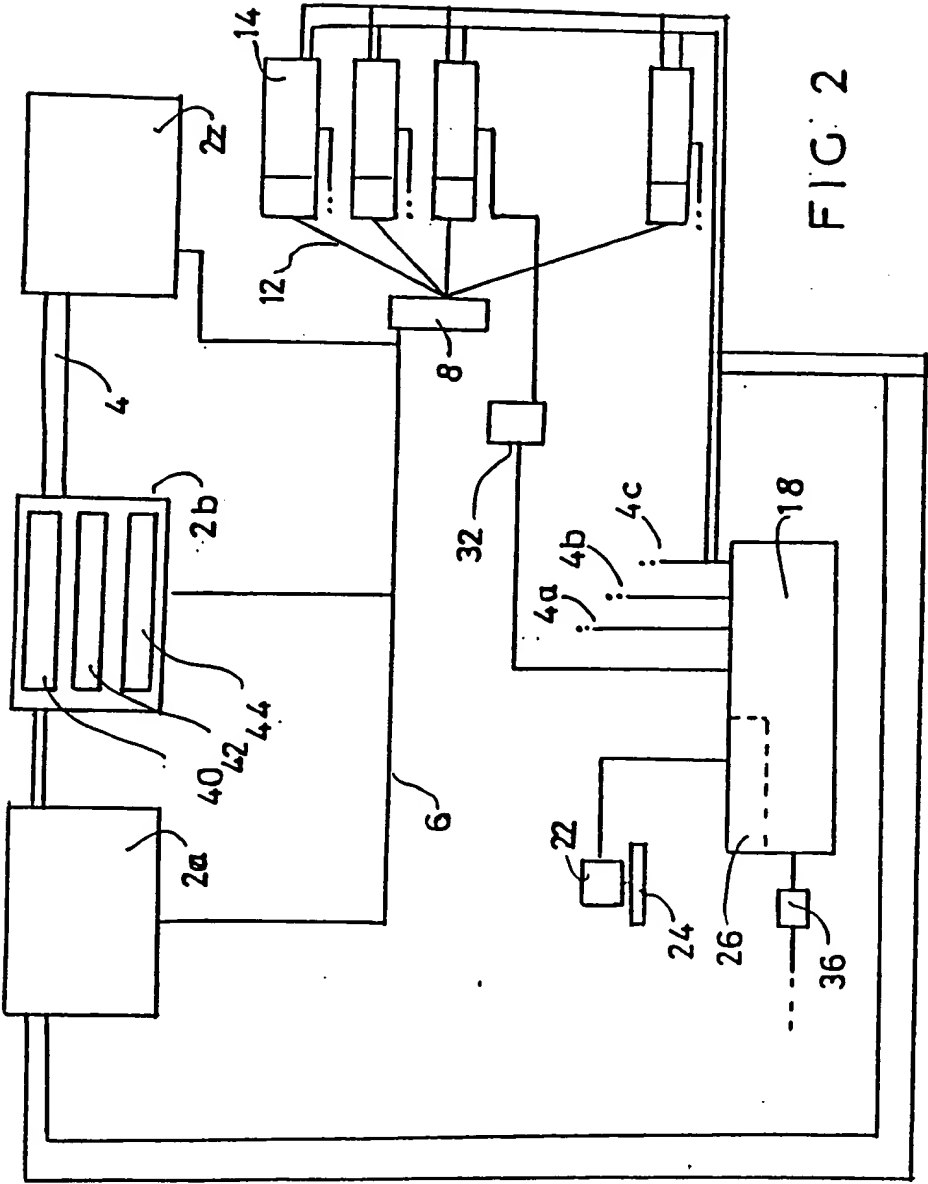


FIG. 2

## SPECIFICATION

## Installation for visually displaying pre-determined messages

5 This invention relates to an installation for visually displaying pre-determined messages, and to display units therefor.

In a number of situations there is a need to transmit to selected workstations centrally pre-determined messages. Different messages may need to be displayed simultaneously at different workstations; a common message may need to be displayed but only at some of the workstations; at any one time, certain of the workstations may have no need of any of the messages currently being transmitted. Two examples of such situations are platform announcements such as train departures or platform changes of interest only to intending passengers, and where a visual message display is to be preferred to a loudspeaker announcement which has to compete for the passenger's attention against varied extraneous noises and which can therefore easily be missed or misunderstood; and on one production line of a number on a factory "floor" to give details of unexpected component shortages affecting only that line and so only affecting a proportion of the workforce.

It is an object of my invention to provide an installation for visually displaying pre-determined messages in which a message is displayed only by pre-selected display units, a different message being displayed by a different selection of display units.

According to my invention I provide an installation for visually displaying pre-determined messages, comprising a plurality of visual display units, a current address for each of the units, a transmission control to generate a message accompanied by a message address, means to interconnect the transmission control and the visual display units to permit communication of the message to the visual display units; means at each visual display unit to compare its current address with the message address, reception means to accept a message only when the current address matches the message address so that the message is only displayed at the display units having a matching address and personality means operative when said reception means is conditioned to accept a message to change the current address of one or more of the display units upon receipt of an address-change message generated at the transmission control.

Conveniently the means to interconnect the transmission control and the visual display units is a hard-wire system accepting standard transmission protocol e.g. RS 232, RS 422, F.S.K. (frequency shift keyed); though in alternative embodiments it could be a closed circuit, co-axial or off-air broadcast system. For greater flexibility preferably the visual display unit will accept both the hard wire and the co-axial cable which will carry UHF (ultra high frequency), VHF (very high frequency) or HF (high frequency) broadcast signals, either digital or analogue or both.

Preferably the units are connected sequentially by a pair of wires in a daisy chain array.

According to another feature of my invention I provide an installation as claimed in claim 1 in which the means to interconnect the transmission control and the visual display units is solely the hard wire system.

Preferably the visual display unit is based upon a commercial television receiver, since these are mass-produced, economic and readily available. They also incorporate a reliable UHF tuning system, useful for accomplishing my invention. Such receivers are often capable of receiving teletext transmissions, that is those wherein signals are broadcast for reception by the receiver aerial socket for both pictures and data, a teletext decoder controlled from the local keyboard being necessary to enable the receiver to make sense of the incoming data and display it as a picture. Some receivers can also be used for VIEWDATA, having a modem connecting the receiver to a telephone jack and acting to convert the digital 0 into a 2100 Hertz tone and the digital 1 into a 1300 Hertz tone, the system being interactive or two-way into the control computer store. Thus it is a feature of my invention that the receivers can be polled in turn automatically following an initiating signal generated at the transmission control, to determine if a message has been left in any receiver memory. Viewdata characters are transmitted separately in standard viewdata protocol; teletext characters are also accepted or transmitted in standard protocol. It will be understood that for a set connected to the transmission control by co-axial cable, there will need to be a local return path transmitter installed at each set for upstream information. Such receivers usually have the facility to accept signals via UHF co-axial cable from a video tape or video disc.

The video tape or disc can be adjacent to the "domestic" television receiver or transmitted as a UHF downstream signal with a pre-recorded message from either disc or tape; thus for instance in a hotel, railway station or factory having a number of visual display units positioned at spaced locations, the receiver may be connected by co-axial cable to video units carrying one or more messages e.g. the action to be taken in case of emergency, news items etc., which messages can be superimposed upon or displayed instead of the current screen image. Such a video unit can be switched on locally, or remotely by the transmission control. In an alternative arrangement the video unit could be at the transmission control so that the message(s) can be updated before being transmitted for display to the selected receivers, having a current address matching that of the message. Thus it is a further feature of my invention to modify such a receiver so that it displays only those messages directed to it, the receiver acting as a display unit and having a personality board or address circuitry in addition to a text encoder and picture circuitry. Further, means must be provided to indicate to which signal received at its socket the receiver has to give priority, and this indication in my invention is carried by the generated message

signal.

The means of generating a message will conveniently generate three or more bytes in succession; the first will indicate to each of the interrogating means that the immediately following signals are not for display by the associated display unit; the second will be an address, which one or more of the interrogating means will recognise and so be readied for a message; and the third and subsequent bytes will indicate to which message source the receiver is to attend, by instructing the receiver to accept from line, from video tape or disc, from its conventional aerial, or from some other signal collector. The receiver or the selected receiver is now ready to display the page transmitted.

The interrogating means is conveniently a microprocessor with either a software address or a hard wired address, with switching between message sources being under the control of an input from a manual keyboard or automatically as when a pre-set position on a tape or disc is reached as indicated for instance by a pre-recorded tone.

The installation can usefully include up to 64 display units, though a larger number for instance 256 is possible; alternatively a group of 64 units can be connected to one pair of lines with say another nine pairs available so that 640 display units can be utilised.

Because commercially available receivers usually have their chassis at +150V it will be necessary to interpose an isolator transformer between the mains supply and the receiver or to add an opto-isolator internally on the receiver.

An installation according to my invention will usually be easy and cheap to set up in or on existing buildings, since connecting wires are only needed between adjacent receivers and not to and from each receiver and the transmission control.

The invention will be further described by way of example with reference to the circuit accompanying diagrams in which:

Fig. 1 is a schematic diagram of one installation and

Fig. 2 is a schematic diagram of another installation.

Units 2a, 2b ... 2z are visual display units, conveniently comprising in this case 62 colour units positioned at spaced locations, and connected by wires 4 and 6.

Wire 6 is an ultra high frequency co-axial cable, connected to an ultra high frequency combiner 8, to which is also connected line 10 from the ultra high frequency aerial 11, and line 12 from video tape or video disc players 14, 16. Wire 6 carries signals conveniently transmitted at 1200 Baud using a standard interface such as the American serial RS 232C, though the RSC 423C interface can be used if required and if compatible to secure higher data transfer speeds and to drive the data to the VDU 2a, 2b ... 2z when one or more of these are located away at greater distances.

Wire 4 is connected to control units 19, 20 associated respectively with the video tape or disc players 14, 16; conveniently control units 19, 20, are identical to units 2a, 2b ... 2z so that the installation

has 64 identical VDU's. Wire 4 is also connected to microprocessor 18 by a 6 pin socket 20, as are parallel data wires 4a, 4b. Microprocessor 18 is connected to a console visual display unit 22, to a keyboard 24 and through integral modem 26 to a telephone line jack 28 and telephone line 30.

In use, the keyboard 24 in conjunction with the microprocessor 18 can be used to design the pages to be displayed, and to store them, preferably externally on computer or on a cartridge facility when the pages are not to be used. This allows frequently-required pages to be stored reliably on low-cost re-usable P.R.O.M.'s to permit a variety of response pages. As is well known, once the pages are designed, the user can select the page to be displayed or another of the available options from a menu which appears on the console visual display unit 22. Microprocessor 18 can be programmed automatically to rotate 100 or more pages at any of the units 2a, 2b ... 2z, or these displays can be manually controlled from keyboard 24. It is possible to determine a pre-selected sequence of pages for display on any one or on a group of the units 2a, 2b ... 2z, or to display a video picture from players 14, 16.

The installation permits three system levels. The basic system has up to sixty two colour visual display units 2a, 2b ... 2z, plus two identical units 19, 20 or any combination of the 64 addresses controlling the video tape/disc players 14, 16, each preferably based on a commercially available television chassis for reliability with economy and with screens or projection sets from 14" to 60" as desired, and in any combination. The microprocessor 18 has its internal software and P.R.O.M. programming facilities and is connected to console visual display unit 22 and keyboard 24. In the second system level, some or all of the units 2a, 2b ... 2z have a personality extension giving each a personal (unique) address, so that a selected page display can be specifically addressed to a chosen unit or group of units 2a, 2b ... 2z, whilst conveniently the other units display no page or continue to display the former page. The third system level includes circuitry to permit the installation to be operated by telephone signals through modem 26, jack 28 and telephone line 30.

The personality boards can each have three options — to accept the broadcast text page, to accept a dedicated message having recognised the address, to switch to video whereupon the ultra high frequency signal to which the visual display unit 2a, 2b, ... 2z is tuned will be displayed with or without sound.

Microprocessor 18 can effect the operation of the 64 visual display units 2a, 2b ... 2z, on each of the output lines provided by wires 4, 4a, 4b. Each of the visual display units can be specifically addressed, and each is capable of being the address point for further "slave" screens, so that the installation can serve a large number of display stations. If required a second microprocessor can be connected to a single transmission line, this second microprocessor being used to prepare a page for

display, whilst the first microprocessor can maintain the service.

The modem 26 permits access to "view-data" or "Prestel" systems, interactively.

- 5 The installation is thus of great advantage for electronic notice boards, public and staff communications, for emergency or other information which has to be widely and rapidly disseminated, and for advertising messages, with  
10 each VDU being under the control of the sender.

- When utilising a domestic television receiver, in addition to the usual television circuitry and text encoder, the personality (address) board unique to that display unit can be made an integral part of the  
15 internal circuitry. For certain applications however, such as when using an installation according to the invention at a temporary exhibition, a separate personality board which can be programmed on site either directly or indirectly through a line message  
20 to provide the unique address may be used.

- In the arrangement of Fig. 2, data lines 4a, 4b are provided in two pairs, for interactive operation between the visual display units 2a, 2b ... 2z and transmission control, instead of a simple balanced  
25 screened pair for outward message transmission only from the transmission control. However, in an alternative embodiment, there may be a control channel in a UHF/VHF co-axial cable.

- The high frequency signal line 6 will carry "off-air" signals, from video tape or disc, sound and vision, as well as full-field teletext, in addition to an  
30 audio channel or sub-sonic or ultra-sonic signals on the audio channel to be used for address-switching.

- The control units 19 associated with video tape or disc players 14 have an addressable intelligent  
35 section 21 to control the programme including the start/stop and signal level; each section 21 includes one of the addresses for units 2a ... 2z i.e. 64 or 256 or more limited only by the difficulties of  
40 management control.

The audio control modulator 32 is used to inject a common signal when high frequency data is to be transmitted to all the visual display units.

- For controlling UHF inputs etc., an additional line  
45 34 is provided i.e. additional to data line 4. The lines will transmit an address followed by data, such data being transmitted from 75 baud to 9600 baud; in any of the common standards e.g. RS 232, F.S.K., balanced line. The line can be screened in metallic  
50 environments, or as standard.

- It will be understood that the visual display units 2a ... 2z, are based on domestic TV sets for low cost and flexibility, but with an additional board to allow the additional data input, local intelligence and  
55 memory and address.

The computer control centre 18 can have an internal modem 26, and be connected to an external modem 36 and telephone jack or the data input and remote control functions.

- 60 Each visual display unit has a specific personality board 40 with the memory, intelligence and address; power unit isolation circuits and text generator 42; and a standard TV chassis 44, all shown schematically for visual display unit 2b. The  
65 display units are linked by a T junction to the line 4,

so that a failure at one set will not disable the remainder. Each display unit can have a Dill switch so that its normal current address can be altered by manual adjustment at the set, as is usual for cable-operated systems, but if so fitted this current  
70 address can be overridden in accordance with my invention by a transmitted signal to the software in personality board 40, which changes the address if and whilst the board 40 is energised; if required the  
75 visual display unit can have a battery to ensure that the board 40 remains continuously energised.

- Whilst a domestic TV will receive broadcast signals on the appropriate channels, in for example a hospital or hotel the sets may be daisy-chained to a coaxial cable; to switch back to a broadcast signal  
80 channel, an RS 232 signal can be sent to the receiver unit on e.g. the one of the twelve coaxial cable channels acting as the text channel. An audio control modulator will switch back from the text  
85 channel to an audio channel. Thus in another suitable application, for a "marketing" session based on a prepared video tape, the tape can be stopped remotely at a selected point and the text mode brought in to display the latest information  
90 e.g. up to date sales figures, whereafter the tape is restarted.

#### CLAIMS

1. An installation for visually displaying  
95 predetermined messages comprising a plurality of visual display units, a current address for each of the units, a transmission control to generate a message accompanied by a message address, means to interconnect the transmission control and the visual  
100 display units to permit communication of the message to the visual display units, means at each visual display unit to compare its current address with the message address, reception means to accept a message only when the current address  
105 matches the message address so that the message is only displayed at the display units having a matching address, and personality means operative when said reception means is conditioned to accept a message to change the current address of one or  
110 more of the display units upon receipt of an address-change message generated at the transmission control.

2. An installation as claimed in claim 1 in which the means to interconnect the transmission control  
115 and the visual display units is a hard-wire system.

3. An installation as claimed in claim 2 in which the visual display units are sequentially connected to a coaxial cable.

4. An installation as claimed in any claims 1—3 in which means are also provided to switch the  
120 transmission standard upon receipt of a transmission-change message generated at the transmission control.

5. An installation as claimed in any of claims 1—4 in which transfer means are also provided to switch  
125 each selected visual display unit to a chosen input channel whilst said reception means is operative to accept message to be displayed so that said message is displayed over or in conjunction with the  
130 visual display from said chosen input channel, said

transfer means also being responsive to a message generated by the transmission control to switch each selected unit to a chosen input channel.

5 6. An installation as claimed in claim 5 in which the chosen input channel is selected from a direct broadcast television system, a cable television system, a subscription television system, a video system and a "viewdata" system.

10 7. An installation as claimed in claim 6 in which the chosen input channel at each selected unit can be remotely switched from sound to silent.

15 8. An installation as claimed in any of claims 1—7 in which at least some of the units have an inbuilt memory, and means at each unit to submit matter to be retained to each respective memory.

9. An installation as claimed in claim 8 in which one or more of said memories can be polled selectively from said transmission control.

20 10. An installation as claimed in any of claims 1—8 in which the visual display units comprise a domestic television set with an added circuit board specific to each unit, which circuit board includes a memory section, a local intelligence section and an address section.

25 11. A method of displaying predetermined messages at selected visual display units having a current address comprising transmitting an

30 address-change to units selected to receive a remotely-generated message, generating the message, generating the address corresponding to the or each display unit to which the message is directed, transmitting the message and address along wires connected to each display unit, interrogating the message and associated address  
35 at each of the display units to compare the message address with the unit address so as to permit the unit to accept and display the message only if the addresses are matched, whereby a group of selected display units can simultaneously display a message and subsequently some or all of that group can simultaneously display another message.

40 12. An installation for visually displaying pre-determined messages substantially as described with reference to Fig. 1 or Fig. 2 of the accompanying drawings.

45 13. A method of displaying pre-determined messages at selected visual display units substantially as described with reference to Fig. 1 or Fig. 2 of the accompanying drawings.

50 14. A visual display unit for use in the installation as claimed in any of claims 1—10.

15. A visual display unit for use in the method as claimed in claim 11.

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